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**NATIONAL
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NASIONALE
SENIOR SERTIFIKAAT**

GRADE 12/GRAAD 12

MATHEMATICS P2/WISKUNDE V2

NOVEMBER 2022

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

**These marking guidelines consist of 24 pages.
*Hierdie nasienriglyne bestaan uit 24 bladsye.***

NOTE:

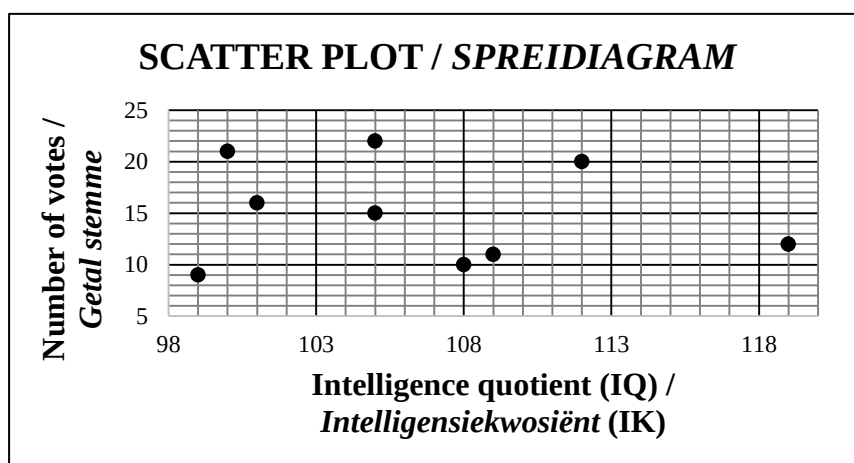
- If a candidate answers a question **TWICE**, only mark the **FIRST** attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed out version.
- Consistent accuracy applies in **ALL** aspects of the marking memorandum. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is **NOT** acceptable.

NOTA:

- As 'n kandidaat 'n vraag **TWEE KEER** beantwoord, merk slegs die **EERSTE** poging.
- As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, merk die doodgetrekte poging.
- Volgehoue akkuraatheid word in **ALLE** aspekte van die memorandum toegepas. Hou op nasien by die tweede berekeningsfout.
- Aanvaar van antwoorde/waardes om 'n probleem op te los, word **NIE** toegelaat nie.

GEOMETRY/MEETKUNDE	
S	A mark for a correct statement (A statement mark is independent of a reason)
	<i>'n Punt vir 'n korrekte bewering</i> (<i>'n Punt vir 'n bewering is onafhanklik van die rede</i>)
R	A mark for the correct reason (A reason mark may only be awarded if the statement is correct)
	<i>'n Punt vir 'n korrekte rede</i> (<i>'n Punt word slegs vir die rede toegeken as die bewering korrek is</i>)
S/R	Award a mark if statement AND reason are both correct
	<i>Ken 'n punt toe as die bewering EN rede beide korrek is</i>

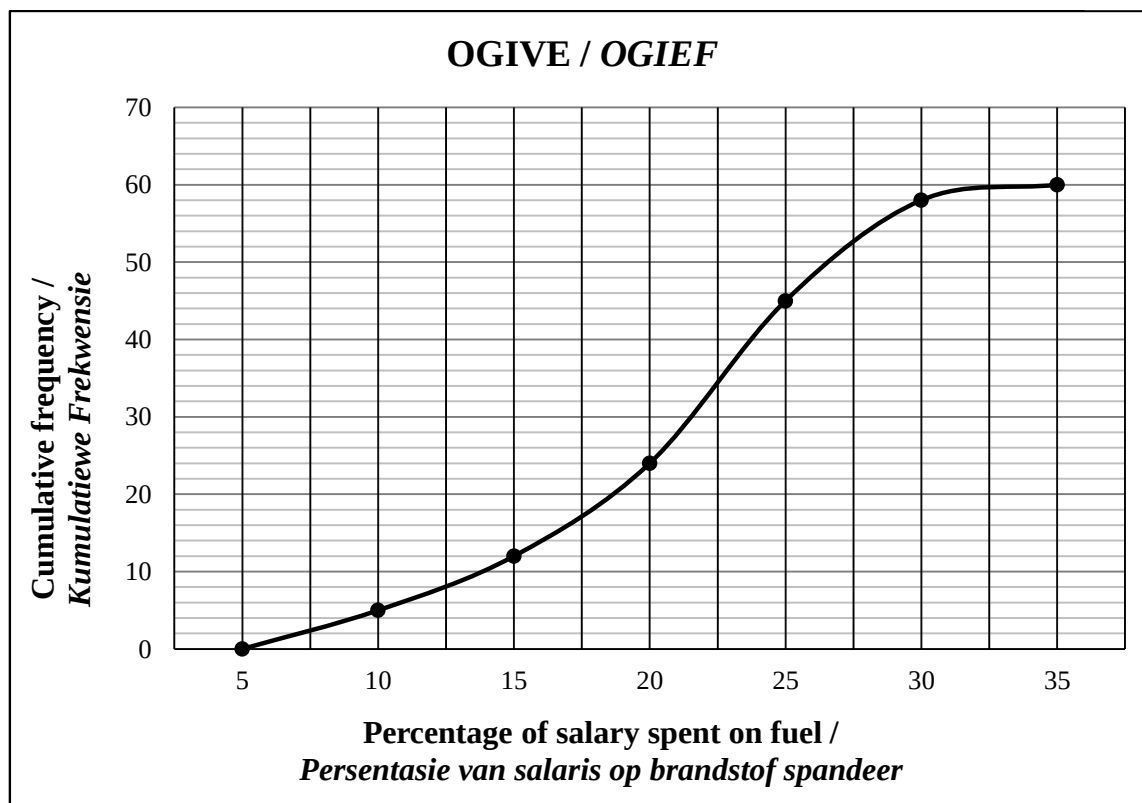
QUESTION/VRAAG 1



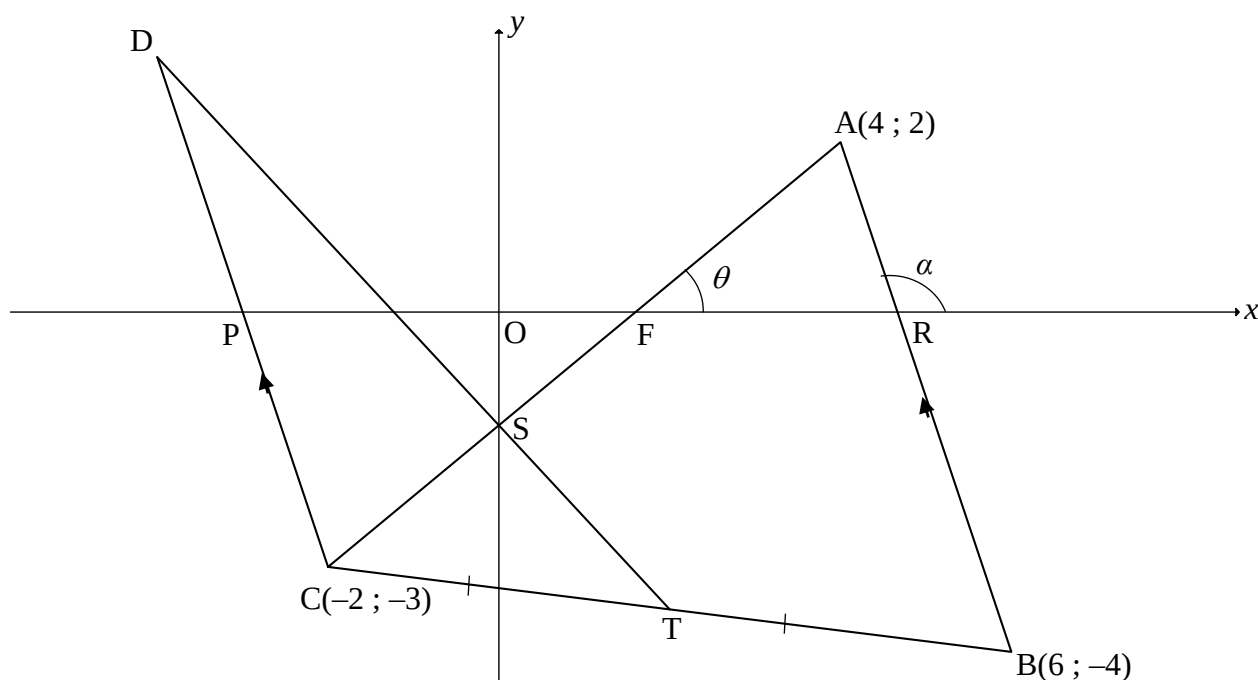
Popularity score (x) Gewildheidspunt (x)	32	89	35	82	50	59	81	40	79	65
Number of votes (y) Getal stemme (y)	9	22	10	21	11	15	20	12	19	16

1.1.1	$\bar{y} = \frac{155}{10}$ $= 15,5$ ANSWER ONLY: Full marks	✓ 155 ✓ answer (2)
1.1.2	SD = 4,59	✓ answer (1)
1.2	$\bar{y} - SD$ $= 15,5 - 4,59$ $= 10,91$ $\therefore 10 - 2 = 8 \text{ learners}$	✓ value of $\bar{y} - SD$ ✓ answer (2)
1.3	$a = 1,7709...$ $b = 0,2243...$ $\hat{y} = 1,77 + 0,22x$	✓ a ✓ b ✓ equation (3)
1.4	$\hat{y} = 1,77 + 0,22(72)$ $= 17,61$ $\approx 18 \text{ votes}$ OR/OF $\hat{y} = 17,92 \approx 18 \text{ votes}$	✓ substitution ✓ answer (2) ✓✓ answer (2)
1.5.1	Points are all scattered therefore low correlation and unrealistic prediction./Punte is versprei daarom 'n lae korrelasie en onrealistiese voorspelling.	✓ R (1)
1.5.2	$r = 0,98$ /correlation very strong/korrelasie baie sterk $\therefore$ a reliable prediction/'n betroubare voorspelling	✓ S (1)
[12]		

QUESTION/VRAAG 2

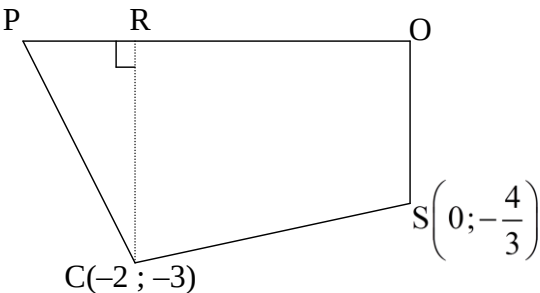
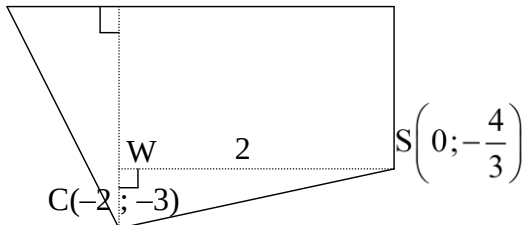


2.1	60 employees	✓ answer (A)	(1)
2.2	$20 < x \leq 25$	✓ answer	(1)
2.3	$60 - 34 = 26$ employees ANSWER ONLY: Full marks	✓ 34 ✓ answer	(2)
2.4	$\text{Salary} = \frac{100}{7} \times 2400$ $\text{Salary} = \text{R}34\,285,71$ ANSWER ONLY: Full marks	✓ method ✓ answer	(2)
2.5	$\therefore$ Ogive/Cumulative frequency graph will shift to the right/will become steeper. $\therefore$ Ogief/Kumulatiewe frekwensie grafiek sal na regs skuif/sal steiler wees.	✓✓ answer	(2)
[8]			

QUESTION/VRAAG 3

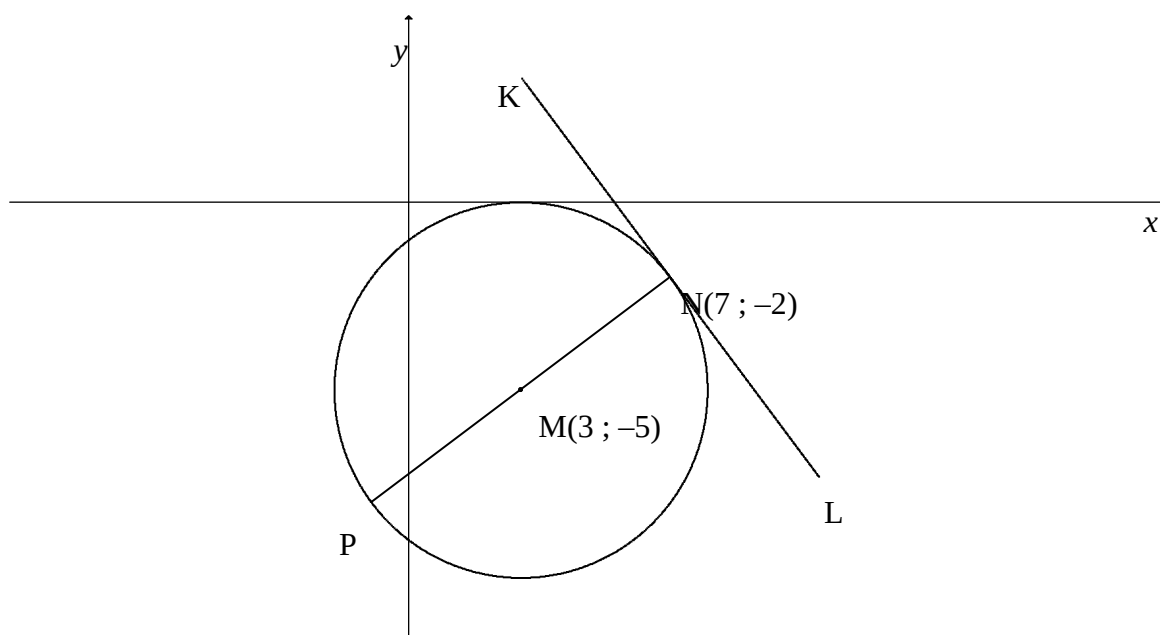
3.1.1	$m_{AB} = \frac{2 - (-4)}{4 - 6}$ OR $m_{AB} = \frac{-4 - 2}{6 - 4}$ $m_{AB} = -3$ ANSWER ONLY: Full marks	✓ substitution ✓ answer (2)
3.1.2	$\tan \alpha = m_{AB} = -3$ $\alpha = 108,43^\circ$ ANSWER ONLY: Full marks	✓ $\tan \alpha = m_{AB} = -3$ ✓ answer (2)
3.1.3	$T\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$ $T\left(\frac{-2 + 6}{2}; \frac{-3 - 4}{2}\right)$ $T\left(2; \frac{-7}{2}\right)$	✓ $x_T = 2$ ✓ $y_T = \frac{-7}{2}$ (2)
3.1.4	$5(0) - 6y = 8$ $y = -\frac{4}{3}$ $S\left(0; \frac{-4}{3}\right)$	✓ $x_S = 0$ ✓ $y_S = \frac{-4}{3}$ (2)
3.2	$m_{CD} = m_{AB} = -3$ $-3 = -3(-2) + c$ OR $y - (-3) = -3(x - (-2))$ $c = -9$ $y = -3x - 9$ $y = -3x - 9$	✓ gradient ✓ substitution of $C(-2; -3)$ ✓ equation (3)

3.3.1	$5x - 6y = 8$ $y = \frac{5}{6}x - \frac{8}{6}$ $\tan \theta = m_{AC} = \frac{5}{6}$ $\theta = 39,81^\circ$ $\hat{A} = 108,43^\circ - 39,81^\circ$ $= 68,62^\circ$ $\hat{DCA} = 68,62^\circ$ [alt $\angle$ s ; DC AB]	$\checkmark \tan \theta = m_{AC} = \frac{5}{6}$ $\checkmark \theta = 39,81^\circ$ $\checkmark \hat{A} = 68,62^\circ$ $\checkmark$ answer (4)
3.3.2	P(-3;0) and F(1,6 ; 0) Area POSC = Area ΔFPC – Area ΔOFS $= \frac{1}{2}(4,6)(3) - \frac{1}{2}(1,6)\left(\frac{4}{3}\right)$ $= 6,9 - 1,07$ $= 5,83 \text{ units}^2$ OR/OF P(-3;0) $FC = \sqrt{\left(-2 - \frac{8}{5}\right)^2 + (-3 - 0)^2} = \frac{3\sqrt{61}}{5}$ Area Δ PFC = $\frac{1}{2}(\text{PF})(\text{FC})\sin\hat{\text{OFS}}$ $= \frac{1}{2}\left(\frac{23}{5}\right)\left(\frac{3\sqrt{61}}{5}\right)\sin 39,81^\circ$ $= 6,90$ Area Δ OFS = $\frac{1}{2}\left(\frac{8}{5}\right)\left(\frac{4}{3}\right)$ $= 1,07$ Area POSC = $6,90 - 1,07$ $= 5,83 \text{ units}^2$ OR/OF	$\checkmark$ P(-3;0) $\checkmark$ method $\checkmark \frac{1}{2}(4,6)(3)$ $\checkmark \frac{1}{2}(1,6)\left(\frac{4}{3}\right)$ $\checkmark$ answer (5)
		$\checkmark$ P(-3;0) $\checkmark \frac{1}{2}\left(\frac{23}{5}\right)\left(\frac{3\sqrt{61}}{5}\right)\sin 39,81^\circ$ $\checkmark \frac{1}{2}\left(\frac{8}{5}\right)\left(\frac{4}{3}\right)$ $\checkmark$ method $\checkmark$ answer (5)

	 P(-3;0) Area of POSC = Area of OSCR + Area of $\triangle PRC$ $= \frac{1}{2} \left(\frac{4}{3} + 3 \right) \times 2 + \frac{1}{2} (1 \times 3)$ $= \frac{35}{6}$ $= 5,83 \text{ units}^2$ OR/ OF  P(-3;0) Area POSC = Area ROSW + Area $\triangle PRC$ + Area $\triangle WSC$ $= \left(\frac{4}{3} \right) (2) + \frac{1}{2} (1)(3) + \frac{1}{2} (2) \left(\frac{5}{3} \right)$ $= \frac{35}{6}$ $= 5,83 \text{ units}^2$ OR/OF	✓ P(-3;0) ✓ method ✓ $\frac{1}{2} \left(\frac{4}{3} + 3 \right) \times 2$ ✓ $\frac{1}{2} (1 \times 3)$ ✓ answer (5) ✓ P(-3;0) ✓ method ✓ $\frac{1}{2} (1)(3)$ ✓ $\left(\frac{4}{3} \right) (2) + \frac{1}{2} (2) \left(\frac{5}{3} \right)$ ✓ answer (5)
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	$P(-3;0)$ $\text{Area of } \triangle PSC = \frac{1}{2}(PC)(CS)\sin \hat{DCA}$ $= \frac{1}{2}(\sqrt{10})\left(\frac{\sqrt{61}}{3}\right)\sin 68,62^\circ$ $= 3,833..$ $\text{Area of } \triangle POS = \frac{1}{2}(PO)(OS)$ $= \frac{1}{2}(3)\left(\frac{4}{3}\right)$ $= 2$ $\text{Area POSC} = 3,833... + 2$ $= 5,83\text{units}^2$	$\checkmark P(-3;0)$ $\checkmark \frac{1}{2}(\sqrt{10})\left(\frac{\sqrt{61}}{3}\right)\sin 68,62^\circ$ $\checkmark \frac{1}{2}(3)\left(\frac{4}{3}\right)$ $\checkmark \text{ method}$ $\checkmark \text{ answer}$ (5)
		[20]

QUESTION/VRAAG 4



4.1	$P(x; y); N(7; -2); M(3; -5)$ $\frac{x+7}{2}=3 \quad \frac{y-2}{2}=-5$ $x=-1 \quad y=-8$ $P(-1; -8)$	$\checkmark x_p = -1 \checkmark y_p = -8$ (2)
4.2.1	$r^2 = (7-3)^2 + (-2-(-5))^2$ OR/OF $r^2 = (-1-3)^2 + (-8-(-5))^2$ $r^2 = 25$ $(x-3)^2 + (y+5)^2 = 25$	$\checkmark$ substitution into distance formula $\checkmark (x-3)^2 + (y+5)^2$ $\checkmark r^2 = 25$ (3)
4.2.2	$m_{\text{radius}} = \frac{-5-(-2)}{3-7} = \frac{3}{4}$ $m_{\text{tangent}} = -\frac{4}{3}$ [radius $\perp$ tangent/raaklyn $\perp$ radius] $-2 = -\frac{4}{3}(7) + c$ OR $y-(-2) = -\frac{4}{3}(x-7)$ $c = \frac{22}{3}$ $y = -\frac{4}{3}x + \frac{22}{3}$	$\checkmark$ substitution $\checkmark m_{\text{radius}} = \frac{-3}{-4} = \frac{3}{4}$ $\checkmark m_{\text{tangent}} = -\frac{4}{3}$ $\checkmark$ substitution of m and $N(7; -2)$ $\checkmark$ equation (5)
4.3	$-8 = -\frac{4}{3}(-1) + c$ $\therefore c = -\frac{28}{3}$ $-\frac{28}{3} < k < \frac{22}{3}$	$\checkmark$ subst m and P $\checkmark$ value of c $\checkmark \checkmark$ answer (4)

4.4.1	$AB^2 = AM^2 - MB^2$ $AB^2 = \left[(t-3)^2 + (t+5)^2 \right] - 5^2$ $= t^2 - 6t + 9 + t^2 + 10t + 25 - 25$ $AB = \sqrt{2t^2 + 4t + 9}$	✓ substitution into Pythagoras ✓ simplification (A) (2)
4.4.2	$t = \frac{-4}{2(2)}$ $= -1$ Minimum at $t = -1$ $AB = \sqrt{2(-1)^2 + 4(-1) + 9}$ $AB = \sqrt{7}$ OR/OF $4t + 4 = 0$ $t = -1$ Minimum at $t = -1$ $AB = \sqrt{2(-1)^2 + 4(-1) + 9}$ $AB = \sqrt{7}$ OR/OF Length of $AB = \sqrt{2t^2 + 4t + 9}$ $= \sqrt{2\left(t^2 + 2t + \frac{9}{2}\right)}$ $= \sqrt{2\left[(t+1)^2 + \frac{7}{2}\right]}$ $= \sqrt{2(t+1)^2 + 7}$ Minimum at $t = -1$ $AB = \sqrt{2(-1)^2 + 4(-1) + 9}$ $AB = \sqrt{7}$	✓ substitution into correct formula ✓ $t = -1$ ✓ substitution ✓ answer (4) ✓ derivative = 0 ✓ $t = -1$ ✓ substitution ✓ answer (4) ✓ completing of the square ✓ $t = -1$ ✓ substitution ✓ answer (4)
		[20]

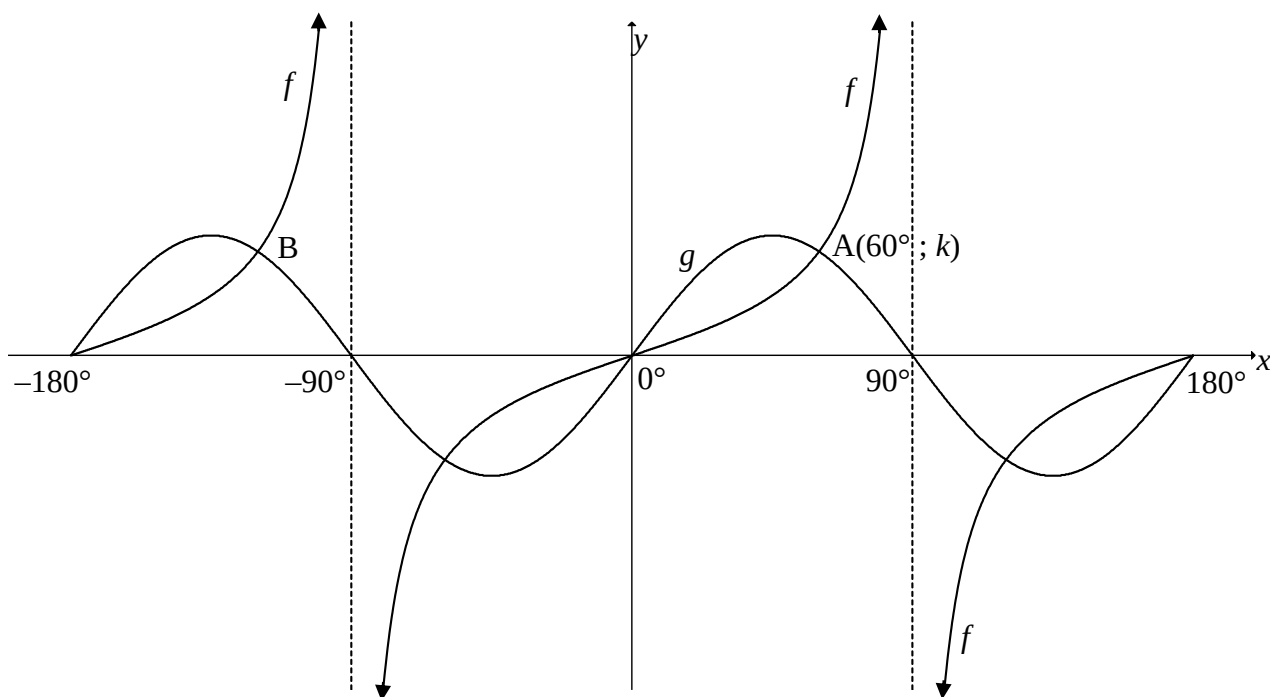
QUESTION/VRAAG 5

5.1.1	$\sin(360^\circ + x)$ $= \sin x$	$\checkmark + \checkmark \sin x$ (2)
5.1.2	$x\text{-coordinate} = \sqrt{(\sqrt{13})^2 - (-3)^2}$ $= -2$ $\tan x = \frac{-3}{-2}$ $= \frac{3}{2}$ OR/OF $x\text{-coordinate} = \sqrt{(\sqrt{13})^2 - (3)^2}$ $= 2$ $\tan x = \frac{3}{2}$	$\checkmark\checkmark$ substitution $\checkmark$ method (3) $\checkmark\checkmark$ substitution $\checkmark$ method (3)
5.1.3	$\cos(180^\circ + x)$ $= -\cos x$	$\checkmark - \checkmark \cos x$ (2)
5.2	$\frac{\cos(90^\circ + \theta)}{\sin(\theta - 180^\circ) + 3\sin(-\theta)}$ $= \frac{-\sin \theta}{\sin(-(180^\circ - \theta)) - 3\sin \theta}$ $= \frac{-\sin \theta}{-\sin \theta - 3\sin \theta}$ $= \frac{-\sin \theta}{-4\sin \theta}$ $= \frac{1}{4}$	$\checkmark - \sin \theta$ $\checkmark - 3\sin \theta$ $\checkmark - \sin \theta$ $\checkmark$ simplification $\checkmark$ answer (5)

5.3	$(\cos x + 2\sin x)(3\sin 2x - 1) = 0$ $\cos x + 2\sin x = 0$ or $3\sin 2x - 1 = 0$ $\tan x = -\frac{1}{2}$ $\sin 2x = \frac{1}{3}$ $\text{ref } \angle = 26,565\dots^\circ$ $\text{ref } \angle = 19,471\dots^\circ$ $x = 153,43^\circ + k.180^\circ; k \in \mathbb{Z}$ $x = 9,74^\circ + k.180^\circ; k \in \mathbb{Z}$ OR/OF or $x = 153,43^\circ + k.360^\circ; k \in \mathbb{Z}$ $x = 80,26^\circ + k.180^\circ;$ $k \in \mathbb{Z}$ or $x = 333,43^\circ + k.360^\circ; k \in \mathbb{Z}$	✓ both equations ✓ $\tan x = -\frac{1}{2}$ ✓ $\sin 2x = \frac{1}{3}$ ✓ $x = 153,43^\circ$ OR $x = 153,43^\circ \& 333,43^\circ$ ✓ $x = 9,74^\circ \& 80,26^\circ$ ✓ $+ k.180^\circ; k \in \mathbb{Z}$ (6)
5.4.1	$\text{LHS} = \cos(x+y).\cos(x-y)$ $= [\cos x.\cos y - \sin x.\sin y][\cos x.\cos y + \sin x.\sin y]$ $= \cos^2 x.\cos^2 y - \sin^2 x.\sin^2 y$ $= (1 - \sin^2 x)(1 - \sin^2 y) - \sin^2 x.\sin^2 y$ $= 1 + \sin^2 x.\sin^2 y - \sin^2 x - \sin^2 y - \sin^2 x.\sin^2 y$ $= 1 - \sin^2 x - \sin^2 y = \text{RHS}$	✓ expansion ✓ simplification ✓ square identity ✓ product (4)
5.4.2	$1 - \sin^2 45^\circ - \sin^2 15^\circ$ $= \cos(45^\circ + 15^\circ).\cos(45^\circ - 15^\circ)$ $= \cos 60^\circ.\cos 30^\circ$ $= \left(\frac{1}{2}\right)\left(\frac{\sqrt{3}}{2}\right)$ $= \frac{\sqrt{3}}{4}$ OR/OF	✓ identifying x and y ✓ substitution ✓ answer (3)

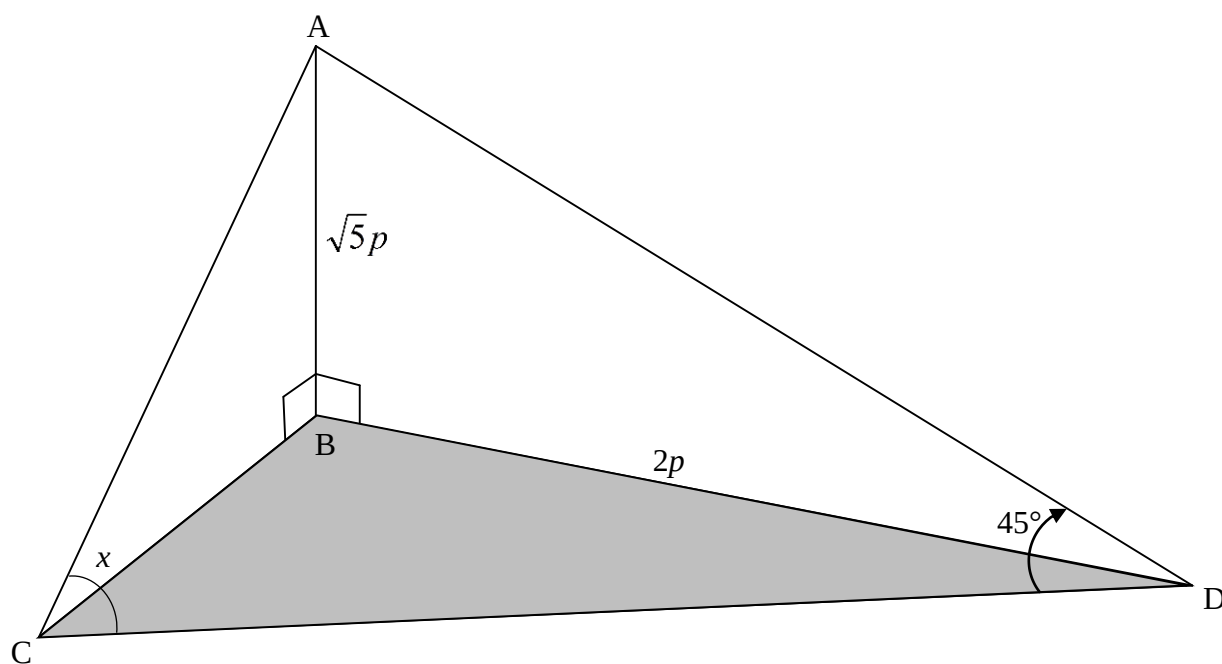
5.5.1	$16\sin x \cdot \cos^3 x - 8\sin x \cdot \cos x$ $= 8\sin x \cdot \cos x (2\cos^2 x - 1)$ $= 4\sin 2x (\cos 2x)$ $= 2\sin 4x$ OR/OF $16\sin x \cdot \cos^3 x - 8\sin x \cdot \cos x$ $= 16\cos^2 x \left(\frac{1}{2} \sin 2x \right) - 8 \left(\frac{1}{2} \sin 2x \right)$ $= 8(2\cos^2 x - 1) \left(\frac{1}{2} \sin 2x \right)$ $= 4\sin 2x \cdot \cos 2x$ $= 2\sin 4x$	✓ factorisation ✓ $4\sin 2x$ ✓ $\cos 2x$ ✓ double angle (4) ✓ factorisation ✓ $4\sin 2x$ ✓ $\cos 2x$ ✓ double angle (4)
5.5.2	$16\sin x \cdot \cos^3 x - 8\sin x \cdot \cos x = 2\sin 4x$ Minimum at $x = 67,5^\circ$	✓ answer (1)
		[30]

QUESTION/VRAAG 6



6.1	180°	✓ answer (1)
6.2.1	$k = \sqrt{3} = 1,73$	✓ answer (1)
6.2.2	$B(-120^\circ; \sqrt{3})$	✓ $x = -120^\circ$ (1)
6.3	Range of g : $y \in [-2; 2]$ Range of $2g(x)$: $y \in [-4; 4]$ OR/OF ANSWER ONLY: Full marks Range of g : $-2 \leq y \leq 2$ Range of $2g(x)$: $-4 \leq y \leq 4$	✓ $y \in [-2; 2]$ ✓ answer (2) ✓ $-2 \leq y \leq 2$ ✓ answer (2)
6.4	$x \in [-65^\circ; -5^\circ]$ OR/OF $-65^\circ \leq x \leq -5^\circ$	✓✓ $x \in [-65^\circ; -5^\circ]$ (2) ✓✓ $-65^\circ \leq x \leq -5^\circ$ (2)
6.5	$\sin x \cdot \cos x = p$ $4 \sin x \cdot \cos x = 4p$ $2 \sin 2x = 4p$ $4p = \pm 2$ $\therefore p = -\frac{1}{2} \text{ or } \frac{1}{2}$ ANSWER ONLY: Full marks	✓ $2 \sin 2x = 4p$ ✓ $4p = \pm 2$ ✓ answers (3)
[10]		

QUESTION/VRAAG 7

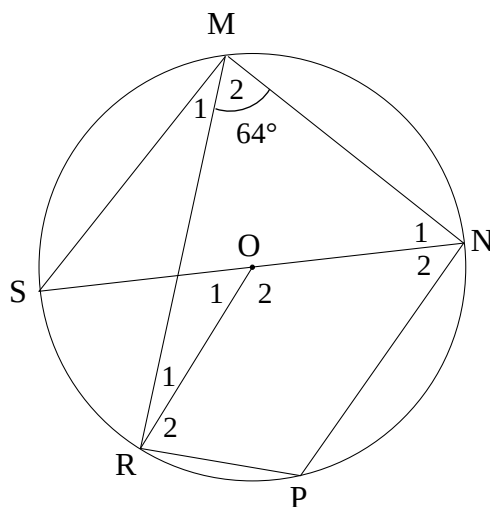


7.1	$AD^2 = AB^2 + BD^2$ $AD^2 = (\sqrt{5}p)^2 + (2p)^2$ $AD^2 = 9p^2$ $AD = 3p$	✓ substitution in Pythagoras ✓ answer (2)
7.2	$\frac{CD}{\sin(135^\circ - x)} = \frac{3p}{\sin x}$ $CD = \frac{3p \sin(135^\circ - x)}{\sin x}$ $CD = \frac{3p(\sin 135^\circ \cos x - \cos 135^\circ \sin x)}{\sin x}$ $CD = \frac{3p(\sin 45^\circ \cos x + \cos 45^\circ \sin x)}{\sin x}$ $CD = \frac{3p\left(\frac{\sqrt{2}}{2} \cos x + \frac{\sqrt{2}}{2} \sin x\right)}{\sin x}$ $CD = \frac{3p\left(\frac{\sqrt{2}}{2}\right)(\cos x + \sin x)}{\sin x}$ $CD = \frac{3p(\sin x + \cos x)}{\sqrt{2} \sin x}$	✓ correct use of sine rule ✓ $135^\circ - x$ ✓ compound angle ✓ special values ✓ factorisation (5)

7.3	$\text{Area } \triangle ADC = \frac{1}{2}(AD)(CD)\sin\hat{A}DC$ $= \frac{1}{2}(3p)\left(\frac{3p(\sin x + \cos x)}{\sqrt{2}\sin x}\right)(\sin 45^\circ)$ $= \frac{1}{2}(30)\left(\frac{30(\sin 110^\circ + \cos 110^\circ)}{\sqrt{2}\sin 110^\circ}\right)\sin 45^\circ$ $= 143,11m^2$	✓ correct use of area rule ✓ substitution in area rule ✓ answer (3)
[10]		

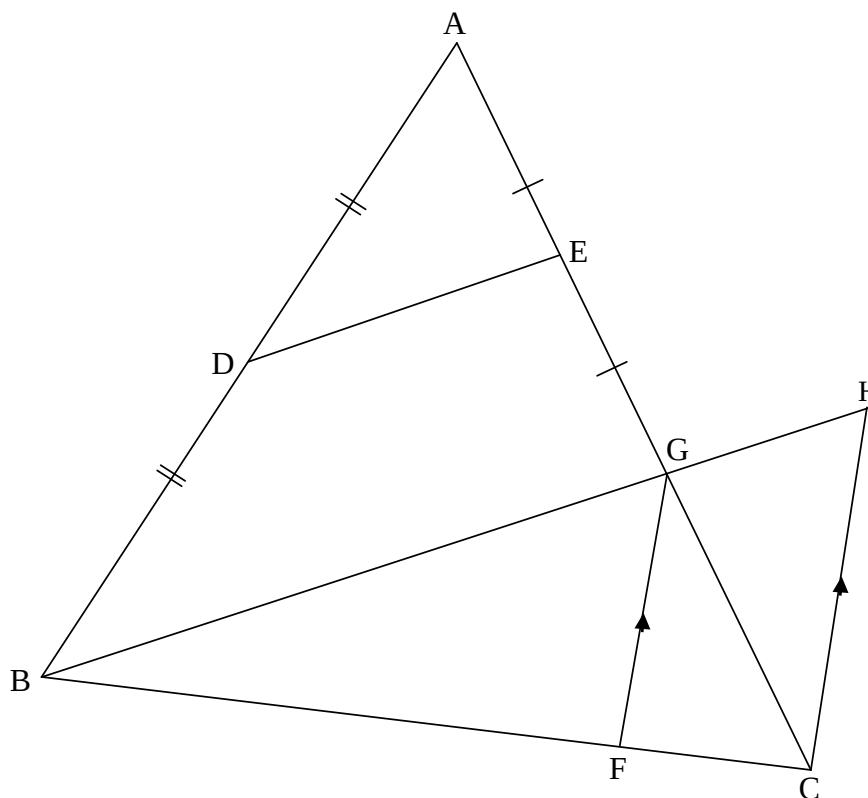
QUESTION/VRAAG 8

8.1



8.1.1	$\hat{P} = 116^\circ$ [opp $\angle$ s of cyclic quad/teenoorst. $\angle$ e van kvh]	✓ S ✓ R (2)
8.1.2	$\hat{M}_1 + 64^\circ = 90^\circ$ [$\angle$ in semi-circle/ $\angle$ in halwe sirkel] $\hat{M}_1 = 26^\circ$	✓ R ✓ S (2)
8.1.3	$\hat{O}_1 = 52^\circ$ [$\angle$ at centre = 2 x $\angle$ at circumference/midpts. $\angle$ = 2 x omtreks. $\angle$]	✓ S ✓ R (2)

8.2

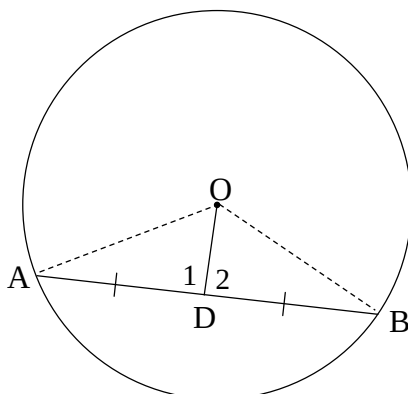


8.2.1	Midpt theorem/Midpt. Stelling OR/OF Converse prop intercept theorem	✓ R (1) ✓ R (1)
8.2.2	BG = 2DE or $6x - 2$ [Midpt theorem/Midpt. stelling] BG = $6x - 2$ $\frac{GH}{BG} = \frac{FC}{BF}$ [line $\parallel$ one side of Δ OR prop theorem; $FG \parallel CH$ / <i>lyn $\parallel$ een sy v. Δ</i>] $\frac{x+1}{6x-2} = \frac{1}{4}$ $4x + 4 = 6x - 2$ $2x = 6$ $x = 3$ OR/OF	✓ S ✓ R ✓ S ✓ R ✓ equation into x ✓ answer (6)

	$\frac{BF}{FC} = \frac{BG}{GH}$ [line $\parallel$ one side of Δ OR prop theorem; $FG \parallel CH$ / <i>lyn $\parallel$ een sy v. Δ</i> $\frac{AE}{AG} = \frac{DE}{BG}$ [$\Delta ADE \parallel \Delta ABG$] $BG = 4x + 4$ $\frac{1}{2} = \frac{3x-1}{4x+4}$ $\therefore 4x + 4 = 6x - 2$ $\therefore x = 3$	✓ S ✓ R ✓ S ✓ R ✓ equation into x ✓ answer (6)
		[13]

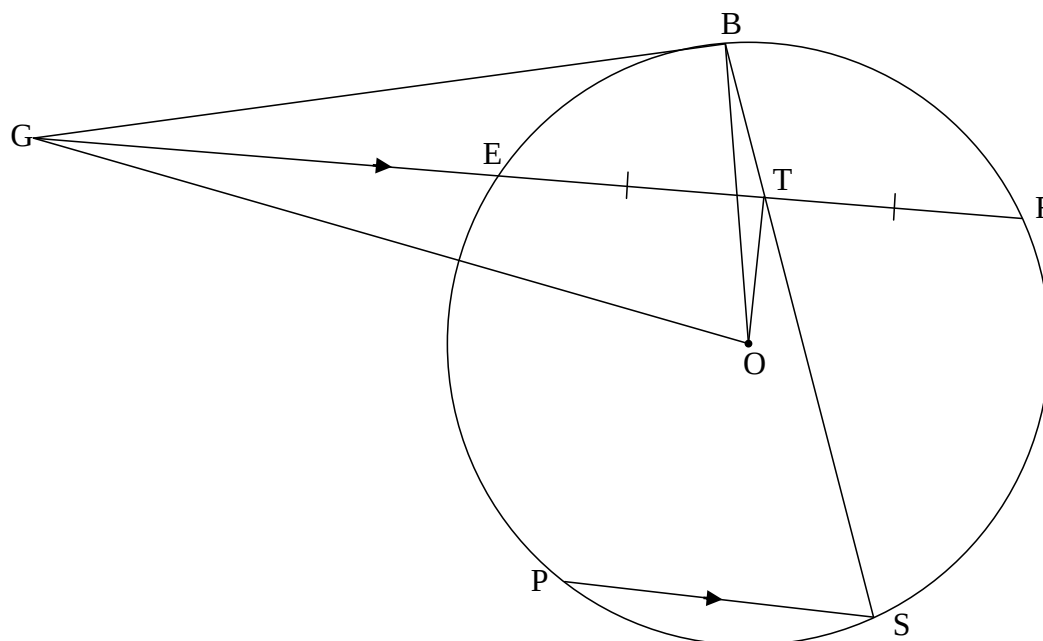
QUESTION/VRAAG 9

9.1



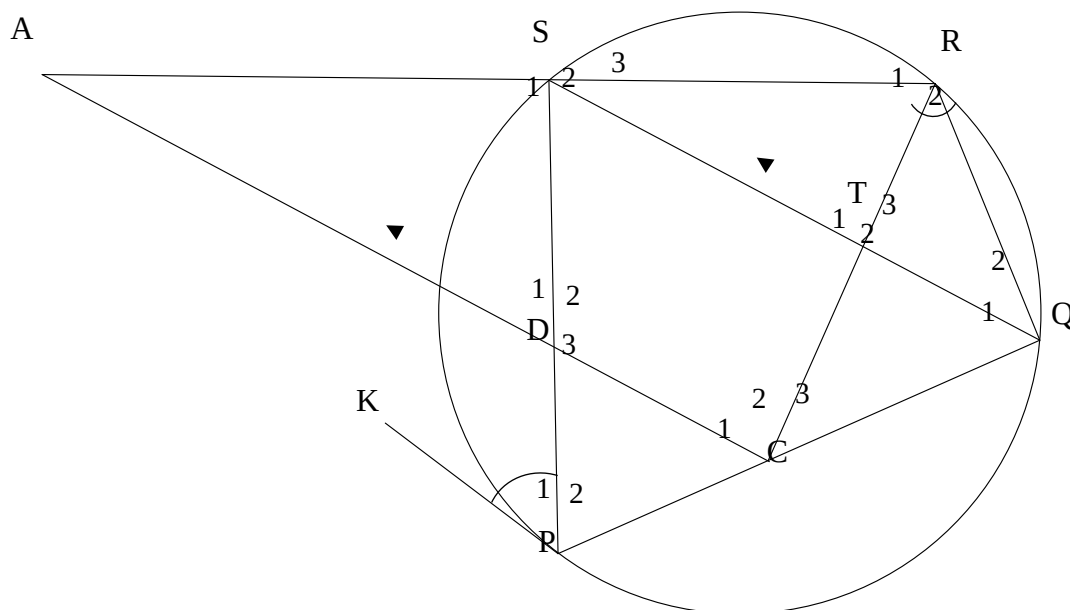
9.1.1	Construction: Draw OA and OB In $\triangle ADO$ and $\triangle BDO$ $OA = OB$ [radii/radiusse] $OD = OD$ [common side/gemeenskaplike sy] $AD = DB$ [given/gegee] $\therefore \triangle ADO \equiv \triangle BDO$ [S;S;S] ADB is a straight line $\therefore \hat{D}_1 = \hat{D}_2$ $\therefore OD \perp AB$ OR/OF Construction: Draw OA and OB In $\triangle ADO$ and $\triangle BDO$ $AD = DB$ [given/gegee] $\hat{A} = \hat{B}$ [$\angle$s opp; $\angle$s sides / $\angle$e teenoor gelyke sye] $OA = OB$ [radii/radiusse] $\therefore \triangle ADO \equiv \triangle BDO$ [S;$\angle$;S] ADB is a straight line $\therefore \hat{D}_1 = \hat{D}_2$ $\therefore OD \perp AB$ $\triangle ADO \equiv \triangle BDO$ [$\angle$s on a str line/$\angle$e op 'n reguitlyn]	✓ construction ✓ first pair of sides ✓ other 2 pairs ✓ R ✓ R (5) ✓ construction ✓ first pair of sides ✓ other 2 pairs ✓ R ✓ R (5)
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9.2



9.2.1	$\hat{O}TG = 90^\circ$ $\hat{O}BG = 90^\circ$ $\therefore \hat{O}TG = \hat{O}BG = 90^\circ$ $\therefore OTBG$ is a cyclic quadrilateral	[line from centre to midpt of chord/ <i>midpt. sirkel; midpt. koord</i>] [tan $\perp$ radius/ <i>raaklyn $\perp$ radius</i>] [line subtends equal $\angle$ s OR converse $\angle$ s in the same segment/ <i>lyn onderspan gelyke $\angle$e</i>]	✓ S ✓ R ✓ S ✓ R ✓ R	(5)
9.2.2	$\hat{S} = \hat{B}TG$ But $\hat{B}TG = \hat{G}OB$ $\hat{G}OB = \hat{S}$	[corresp $\angle$ s; $GF \parallel PS$ / <i>ooreenk. $\angle$s; $GF \parallel PS$] [$\angle$s in the same segment/$\angle$e in dies. <i>sirkelsegment</i>] </i>	✓ S ✓ R ✓ S ✓ R	(4)
[14]				

QUESTION/VRAAG 10



10.1	$\hat{P}_1 = \hat{Q}_1$ $\hat{S}_1 = \hat{Q}_1 + \hat{Q}_2$ $\therefore \hat{S}_1 = \hat{P}_1 + \hat{Q}_2$ $\hat{T}_2 = \hat{R}_2 + \hat{Q}_2$ but $\hat{P}_1 = \hat{R}_2$ $\hat{T}_2 = \hat{P}_1 + \hat{Q}_2$ $\therefore \hat{S}_1 = \hat{T}_2 = \hat{P}_1 + \hat{Q}_2$	[tan-chord theorem/ <i>∠ tussen raaklyn en koord</i>] [ext $\angle$ of cyclic quad/ <i>buite $\angle$ v. kvh</i>] [ext $\angle$ of Δ / <i>buite $\angle$ v. Δ</i>] [<i>given/gegee</i>]	✓ S ✓ S / R ✓ S ✓ S
10.2	In ΔASD and ΔACR $\hat{A} = \hat{A}$ $\hat{S}_1 = \hat{T}_2$ $\hat{T}_2 = \hat{C}_2$] $\therefore \hat{S}_1 = \hat{C}_2$ $\hat{D}_1 = \hat{R}_1$ $\Delta ASD \parallel \Delta ACR$ $\therefore \frac{AD}{AR} = \frac{AS}{AC}$ OR/OF	[common $\angle$ / <i>gemeenskaplike $\angle$</i>] [<i>proven/reeds bewys</i>] [alt $\angle$ s; $QS \parallel CA$ / <i>verw. $\angle$e; $QS \parallel CA$</i>] [sum of $\angle$ s in Δ / <i>$\angle$e v. Δ</i>] [corresponding sides in proportion/ <i>ooreenstemmende sy in dies. verhouding</i>]	✓ identifying Δ 's ✓ S ✓ S / R ✓ S ✓ S

(4)

(5)

	In $\triangle ASD$ and $\triangle ACR$ $\hat{A} = \hat{A}$ [common $\angle$/gemeenskaplike $\angle$] $\hat{S}_1 = \hat{T}_2$ [proven/gegee] $\hat{T}_2 = \hat{C}_2$ [alt $\angle$s; $QS \parallel CA$/verw. $\angle$e; $QS \parallel CA$] $\therefore \hat{S}_1 = \hat{C}_2$ $\triangle ASD \parallel \triangle ACR$ [$\angle$; $\angle$; $\angle$] $\therefore \frac{AD}{AR} = \frac{AS}{AC}$ [corresponding sides in proportion/ ooreenstemmende sy in dies. verhouding]	✓ identifying $\triangle$'s ✓ S ✓ S/R ✓ S ✓ R
10.3	$\frac{AS}{AC} = \frac{SD}{CR}$ [$\triangle ASD \parallel \triangle ACR$] $\therefore AS = \frac{AC \times SD}{CR}$ $\frac{AS}{AR} = \frac{CT}{CR}$ [line $\parallel$ one side of $\triangle$ OR prop theorem; TS $\parallel$ CA/lyn $\parallel$ een sy v. $\triangle$] $\therefore AS = \frac{AR \times CT}{CR}$ $\therefore \frac{AC \times SD}{CR} = \frac{AR \times CT}{CR}$ $\therefore AC \times SD = AR \times CT$	✓ S ✓ S ✓ R ✓ equating
		(5)
		(4)
		[13]

TOTAL/TOTAAL: 150